CHAPTER 4
VEGETATION

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4.1 Introduction

Today's Buffalo River bears little resemblance to the stream that existed before the city was developed. The pre-settlement river was smaller and much shallower, and was fringed with extensive wetlands (Sweeney and Merkel 1972, Rossi 1996). However, the commercial value of the Buffalo River was realized as early as the 1820s, following the selection of Buffalo as the terminus of the Erie Canal. As extensive population growth and industrialization followed, the river was gradually channelized and deepened into its present form (Sweeney and Merckel 1972). While increases in channel width and depth facilitated industry and commerce, they also dramatically lengthened hydraulic retention time and exacerbated the ensuing decline in environmental health.

Environmental impacts of the Buffalo River's industrialization extend well beyond the water's edge. Much of the shoreline is "hardened" by mooring pilings, stone rip-rap, steel bulkheads, and structures built right to the river's edge. Submerged (macrophyte) and emergent (wetland) vegetation is limited because both above- and below-water riverbanks slope unnaturally steeply. Surrounding land is dominated by post-industrial "brownfields", often with highly disturbed soils and degraded vegetation. Invasive species abound.

The objective of this aspect of our Buffalo River assessment was to catalogue the structure and composition of submerged, emergent, and terrestrial vegetation communities at potential habitat restoration sites. It is essential to remediation efforts to assess the integrity of the flora, both as ecosystem components in their own right, and as structural components of wildlife habitat.

4.2 Methods

Presence/absence vegetation surveys were conducted at potential habitat restoration sites during August 2004 and August 2005. Included were woody and herbaceous terrestrial vegetation and submerged aquatic macrophytes. Materials were identified to species according to Gleason and Cronquist (1991) and Holmgren (1998). Plants were identified as invasive according to USDA (2005). Voucher specimens of all taxa are housed in the Herbarium of Youngstown State University. Percentage of overhanging shoreline cover was estimated in the field, and from the detailed satellite images presented in Figure 4.1.

4.3 Results and Discussion

More than fifty plant species (Table 4.1) were collected from Buffalo River shoreline sites, suggesting the potential for vigorous, productive plant communities to establish here. Perhaps not surprisingly, though, a number of taxa were invasives that exploit disturbed habitats.

Native black willow was often the dominant woody overstory plant, providing shade, habitat, and underwater structure when its brittle limbs fall into the river. Other native species such as eastern cottonwood, green ash, and silver maple occur at habitat restoration sites, but, unfortunately, so does the aggressive invasive tree-of-heaven. This species will readily displace native trees, and can grow under literally any soil condition, including cracks in pavement and/or masonry. Patches of tree-of-heaven are particularly well established at site 6, which is otherwise dominated by native black willow.

Habitat restoration sites differ markedly in their development of overhanging cover, ranging from near total (~80%) cover at site 1 (confluence with Cazenovia Creek) to 0% at site 3, the recently re-graded "Color Peninsula" (Figure 4.1, Figure 4.2).

Herbaceous vegetation is well developed at all sites, even where much of the shoreline is composed of stone rip-rap (e.g., sites 3 and 9). However, two nuisance invasives, purple loosestrife and especially Japanese knotweed, are also abundant. Japanese knotweed has established thick monospecific stands at several sites. Emergent wetland vegetation (cattails, reeds, etc.) is relatively limited, given the prevailing steepness of the riverbanks. Submerged macrophyte beds also are not extensive (again, due to the steeply sloping shoreline), but are present at most sites. Native American eelgrass and the pondweeds tend to dominate early in the season, while invasive Eurasian watermilfoil increases from August onward.

Invasive plant species stand as an impediment to habitat restoration along the Buffalo River, although all exotics may not pose equally great threats to community integrity. Many are relatively benign. Several, however, can seriously degrade a site both ecologically and in terms of aesthetics and recreation. (E.g., Japanese knotweed excludes all other vegetation, degrading the habitat, and also poses a physical obstacle to recreational access.) Therefore, we recommend that the serious nuisance invasives tree-of-heaven, Japanese knotweed, purple loosestrife, and submerged Eurasian watermilfoil should be subject to eradication campaigns as part of habitat restoration efforts. These species are difficult to eliminate completely, but they often can be controlled locally by diligent monitoring and periodic removal.

4.4 References

Gleason, H. A., and A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. The New York Botanical Garden, Bronx, New York.

Holmgren, N. H. 1998. Illustrated Companion to Gleason and Cronquist's Manual: Illustrations of the Vascular Plants of Northeastern United States and Adjacent Canada. The New York Botanical Garden, Bronx, New York.

USDA. 2005. Plants Database. http://plants.usda.gov/index.html.

Table 4.1. Occurrence (shoreline) of plant species in Buffalo River AOC. Asterisk (*) indicates non-native. Bold indicates nuisance invasive.

		Site									
Scientific name	**Common name**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Woody species											
Acer negundo L.	Ashleaf maple						X				
Acer saccharinum L.	Silver maple		X								
Ailanthus altissima (Miller) Swingle	Tree of heaven				X		X				
Cornus sericea L.	Red osier dofwood								X	X	X
Fraxinus pensylvanica Marshall	Green ash					X					
**Lonicera morrowii* A. Gray	Morrow's honeysuckle									X	
Populus deltoides Marshall	Eastern cottonwood							X		X	X
Rhus typhina L.	Staghorn sumac		X						X		X
Salix nigra Marshall	Black willow	X	X		X	X	X	X	X	X	X
**Ulmus pumila* L.	Siberian elm		X								
Herbaceous species											
Circaea lutetiana L.	Enchanter's nightshade					X					
Cirsium arvense (L.) Scop.	Canada thistle								X		
**Coronilla varia* L.	Crown vetch	X									
Cuscuta gronovii Willd.	Dodder		X								
**Dipsacus slyvestris* Hudson	Teasel					X					
Elymus canadensis L.	Wild rye								X		
Equisetum arvense L.	Horsetail		X								
Eupatorium maculatum L.	Joepyeweed										X
Eupatorium perfoliatum L.	Joepyeweed							X			
Eupatorium purpureum L.	Joepyeweed									X	
**Euphorbia esula* L.	Leafy spurge							X			
Galeopsis tetrahit L.	Hempnettle							X			
Geum virginianum L.	Cream avens		X								
Helianthus tuberosus L.	Jerusalem artichoke				X	X					
**Hesperis matronalis* L.	Dames rocket						X				
Hypericum perforatum L.	St. Johnswort		X								
Impatiens capensis Meerb.	Jewelweed	X									
**Linaria vulgaris* Miller	Butter and eggs		X								
Lythrum salicaria L.	Purple loosestrife		X					X	X	X	X
Medicago sativa L.	Alfalfa		X								
Mentha arvensis L.	Wild mint				X				X	X	
**Nepeta cataria* L.	Catnip										X
Polygonum cuspidatum Sieb. & Zucc.	Japanese knotweed						X		X	X	X
Polygonum hydropiperoides Michx.	Swamp smartweed					X				X	X
Pontederia cordata L.	Pickerelweed			X							
Potentilla reptans L.	Creeping cinquefoil	X									
**Rumex obtusifolius* L.	Bitter dock				X						
Scrophularia marilandica L.	Carpenter's square					X		X			
**Sinapsis arvensis* L.	Charlock mustard	X			X						X
Solanum dulcamara L.	Climbing nightshade									X	
Solanum nigrum L.	Black nightshade							X			
Solidago gigantea Ait.	Giant goldenrod	X									
**Tussilago farfara* L.	Coltsfoot								X		
Verbena urticifolia L.	White vervain							X	X		X
Vitis riparia Michx.	Riverbank grape					X			X		
Aquatic species											
Myriophyllum spicatum L.	Eurasian watermilfoil		X	X	X	X	X	X	X	X	X
**Potamogeton crispus* L.	Curlyleaf pondweed			X			X	X			
Potamogeton filiformis Pers.	Fine leaf pondweed				X	X		X			
Potamogeton sp.	Pondweed						X				X
Vallisneria americana L.	American eelgrass						X	X	X	X	X

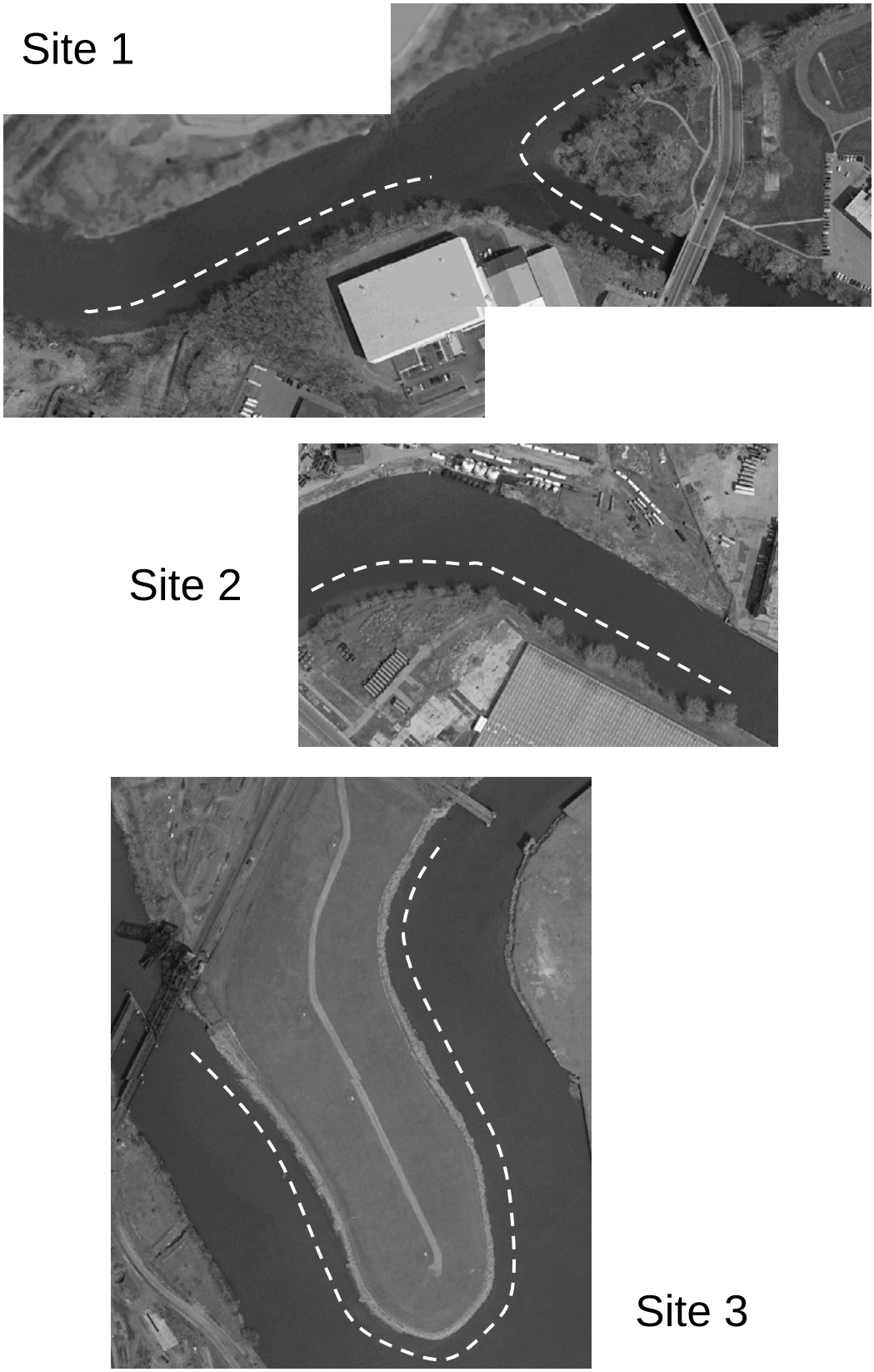
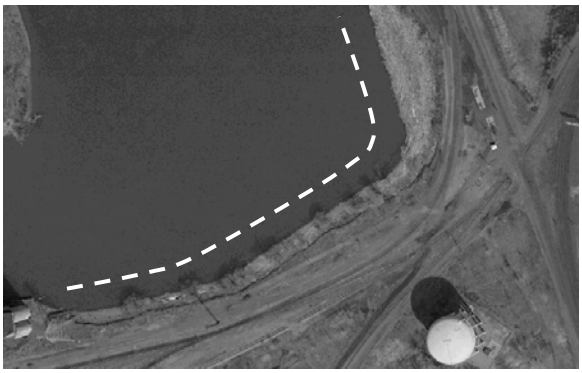


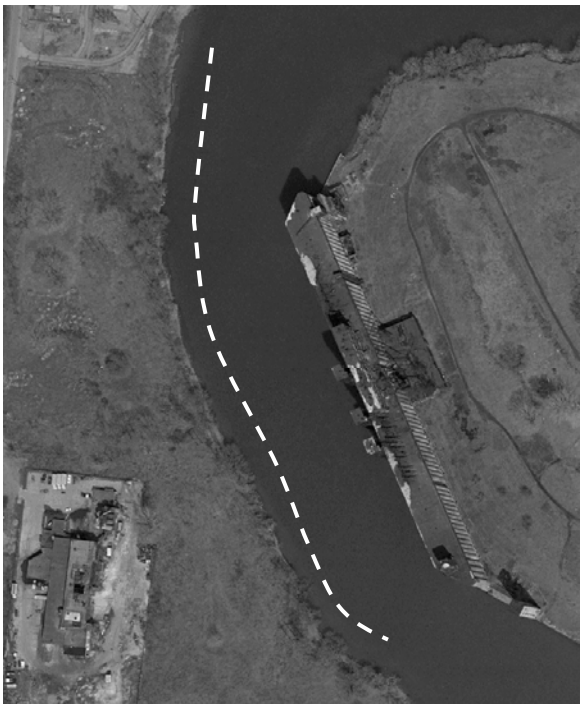
Figure 4.1 Aerial views (satellite ortho-imagery) of potential habitat restoration sites.

Site 4

Site 5



Site 7



Site 6